IA260 Hardware User's Manual

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IA260 Hardware User's Manual

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Table of Contents

Chapter 1 Introduction 1-1

Overview 1-2
Model Descriptions and Package Checklist 1-2
Product Features 1-3
Product Hardware Specifications 1-3
Hardware Block Diagram 1-5

Chapter 2 Hardware Introduction 2-1

Appearance 2-2
Dimensions 2-3
LED Indicators 2-4
Reset Button 2-4
Real Time Clock 2-5
Placement Options 2-5
DIN-Rail Mounting 2-5
Wall Mounting (optional) 2-6

Chapter 3 Hardware Connection Description 3-1

Wiring Requirements 3-2
Connecting the Power 3-2
Grounding the Unit 3-3
Connecting to the Console Port 3-3
Connecting to a Display 3-4
Connecting to a Keyboard and Mouse 3-4
Connecting to the Network 3-4
Connecting to a Serial Device 3-5
Connecting to the DI/DO 3-5
Digital Input Wiring 3-6
Digital Output Wiring 3-6
Insert CompactFlash Card 3-6
USB Hosts 3-8

Appendix A Regulatory Approval Statements A-1

1

Introduction

Thank you for purchasing the Moxa IA260 RISC-based industrial ready-to-run embedded computer. This computer features 4 RS-232/422/485 serial ports, dual 10/100 Mbps Ethernet ports, 8 digital input and 8 digital output channels, a VGA output, a CompactFlash socket for adding additional storage space, and USB ports for a keyboard/mouse connection or for adding additional storage space. These features make the IA260 series ideal for your industrial embedded applications, such as SCADA, manufacturing automation, and other industrial applications.

This manual introduces the IA260's hardware. After a brief introduction of the hardware features, the manual focuses on installation and configuration.

The following topics are covered in this chapter:

- **Overview**
- **Model Descriptions and Package Checklist**
- **Product Features**
- **Cirrus Logic EP9315 ARM9 CPU, 200 MHz**
  - 128 MB RAM on-board, 32 MB Flash Disk
  - VGA interface for field site monitoring
  - 4 RS-232/422/485 serial ports
  - Dual 10/100 Mbps Ethernet ports for network redundancy
  - 8+8 DI/DO channels
  - 12 to 48VDC power input design
  - Supports CF socket and USB 2.0 Host
  - Ready-to-Run WinCE 6.0 platform
  - -40 to 75°C wide temperature model available
- **Product Hardware Specifications**
- **Hardware Block Diagram**

Overview

The IA260 embedded computers feature 4 RS-232/422/485 serial ports, dual Ethernet ports, 8 digital input channels, 8 digital output channels, VGA output, 2 USB hosts and a CompactFlash socket in a compact, industrial-strength aluminum rugged casing. The DIN-Rail vertical form factor makes the IA260 a cost effective solution for installation in small cabinets. This space-saving solution also makes wiring easy, and is the best front-end embedded controller for industrial applications.

Because of its VGA output capability, the IA260 can be used for protocol conversion or data acquisition for field site devices, and is also suitable for SCADA systems in industrial applications, such as manufacturing automation, production line process monitoring, and mining automation. It can serve as an operator interface terminal at a field site by connecting a VGA monitor and appropriate HMI software.

The IA260 comes with RS-232/422/485 ports, digital inputs and outputs, and dual LAN ports, making it an ideal communication platform for redundant network applications.

In addition to the standard model, the IA260 also comes in a wide temperature model. The IA260-T has an operating temperature range of -40 to 75°C, making it suitable for harsh industrial automation environments. The IA260's industrial design provides robust and reliable computing, and the RISC-based architecture allows the IA260 to operate without generating too much heat. The high communication performance and fan-less design make the IA260 ideal for industrial automation environments.

The IA260 embedded computer uses a Cirrus Logic EP9315 ARM9, 32-bit, 200 MHz RISC CPU. Unlike the X86 CPU, which uses a CISC design, the RISC design architecture and modern semiconductor technology provide the IA260 with a powerful computing engine and communication functions, but without generating a lot of heat. The built-in 32 MB NOR Flash ROM and 128 MB SDRAM give you enough memory to run your application software directly on the IA260.

The IA260 comes with the Windows CE 6.0 operating system pre-installed. WinCE 6.0 supports general Windows and .NET CF 2.0 environments. This means that programs developed with standard programming tools such as Embedded Visual C++ or Visual Studio 2005 in Windows PC environments can operate on the IA260 without too much porting effort.

Model Descriptions and Package Checklist

Two models of the IA260 are available:

IA260-CE
RISC-based embedded computer with VGA, 4 serial ports, dual LANs, DIO, CompactFlash, USB, WinCE 6.0

IA260-T-CE
RISC-based embedded computer with VGA, 4 serial ports, dual LANs, DIO, CompactFlash, USB, WinCE 6.0, wide operating temperature

Both models are shipped with the following items:

- 1 IA260 Embedded Computer
- Wall-Mounting Kit
- DIN-Rail Mounting Kit (attach to the product's casing)
- Quick Installation Guide
- Document & Software CD
- Cross-over Ethernet cable

- CBL-4PINDB9F-150: 150 cm, 4-pin header to DB9 female console port cable
- Universal Power Adaptor (includes terminal block to power jack converter)
- Product Warranty Statement

NOTE: *Notify your sales representative if any of the above items are missing or damaged.*

Product Features

- Cirrus Logic EP9315 ARM9 CPU, 200 MHz
- 128 MB RAM on-board, 32 MB Flash Disk
- VGA interface for field site monitoring
- 4 RS-232/422/485 serial ports
- Dual 10/100 Mbps Ethernet ports for network redundancy
- 8+8 DI/DO channels
- 12 to 48VDC power input design
- Supports CF socket and USB 2.0 Host
- Ready-to-Run WinCE 6.0 platform
- -40 to 75°C wide temperature model available

Product Hardware Specifications

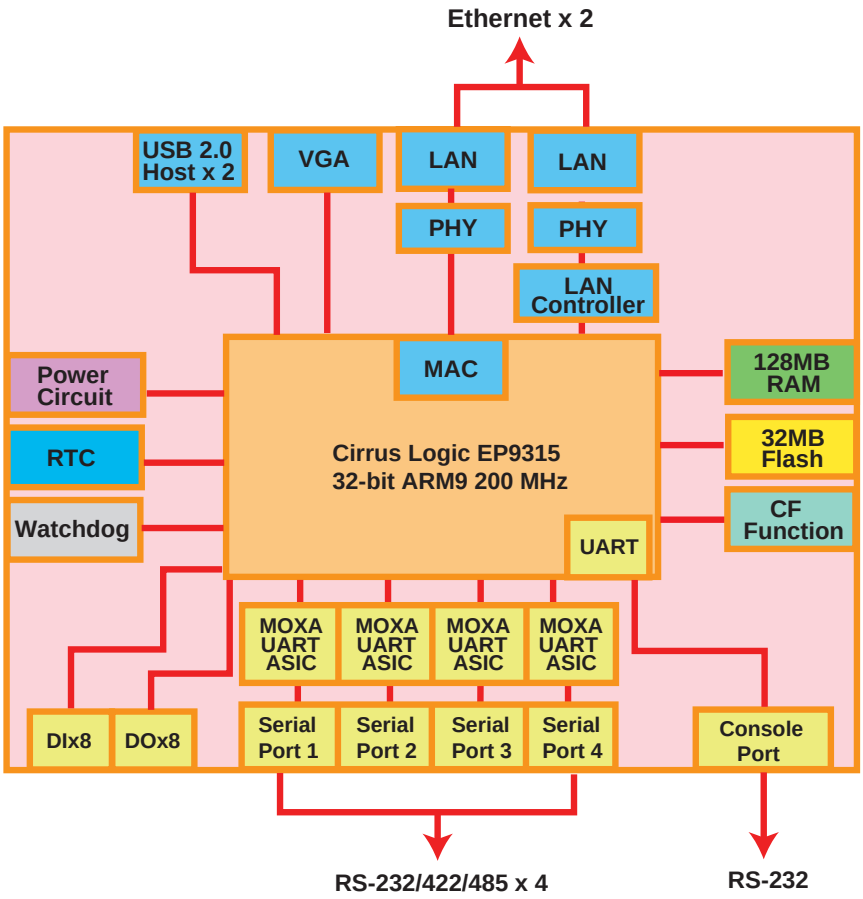
Computer	
CPU	Cirrus Logic EP9315 ARM9 CPU, 200 MHz
DRAM	128 MB onboard (optional 256 MB)
Flash	32 MB onboard (optional 64 MB)
Storage Expansion	CompactFlash socket
USB	USB Host x 2 compliant to USB 2.0 (OHCI), Type A connector
Reset Button	Supports "Reset to Factory Default"
OS (pre-installed)	WinCE 6.0
LAN Interface	
Ethernet	Auto-sensing 10/100 Mbps x 2, RJ45 connectors
Magnetic Isolation Protection	1.5 KV built-in
Serial Interface	
Number of Ports	4
Serial Standards	RS-232/422/485, software-selectable
Connectors	DB9 male
Console/Debugging Port	RS-232 (TxD, RxD, GND), 4-pin header output (115200, n, 8, 1)
Serial Communication Parameters	
Data Bits	5, 6, 7, 8
Stop Bits	1, 1.5, 2
Parity	None, Even, Odd, Space, Mark
Flow Control	RTS/CTS, XON/XOFF, ADDC™ (automatic data direction control) for RS-485
Baudrate	50 bps to 921.6 Kbps (supports non-standard baudrates; see user's manual for details)

Serial Signals	RS-232: TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND RS-422: TxD+, TxD-, RxD+, RxD-, GND RS-485-4w: TxD+, TxD-, RxD+, RxD-, GND RS-485-2w: Data+, Data-, GND
Digital Input	
Input Channels	8, source type
Input Voltage	0-30 VDC at 5 KHz
Digital input levels	Dry contact: Logic level 0: Close to GND Logic level 1: Open Wet contact: Logic level 0: +3V max Logic level 1: +10V ~ +30V (COM to DI)
Connector Type	10-pin screw terminal block (8 points / COM / GND)
Digital Output	
Output Channels	8, sink type
On-state Voltage	24 VDC nominal, open collector to 30 V
Connector Type	9-pin screw terminal block (8 points, GND)
Display	
Graphics Controller	EP9315 internal graphics accelerator engine with TTL graphical signal support
Display Memory	Dynamic video memory (shares system memory)
Graphics Resolution	1024 x 768, 8 bits
Display Interface	CRT interface for VGA output, DB15 female connector
LEDs	
System	Power x 1, Ready x 1, Storage x 1
LAN	10M/Link x 2, 100M/Link x 2 (on connector)
Serial	TxD x 4, RxD x 4
Physical Characteristics	
Dimensions (W x D x H)	52 x 112.6 x 162 mm (2.05 x 4.43 x 6.38 in)
Gross Weight	1 kg
Housing	Aluminum, industrial vertical form factor
Mounting	DIN-Rail, wall
Environmental Limits	
Operating Temperature	Standard Models: -10 to 60°C (14 to 140°F) Wide Temp. Models: -40 to 75°C (-40 to 167°F)
Operating Humidity	5 to 95% RH
Storage Temperature	Standard Models: -20 to 80°C (-4 to 176°F) Wide Temp. Models: -40 to 85°C (-40 to 185°F)
Power Requirements	
Input Voltage	12 to 48 VDC (3-pin terminal block)
Power Consumption	480 mA @ 12 VDC (with no load on USB ports) 900 mA @ 12 VDC (with load on 2 USB ports)

Regulatory Approvals	
EMC	CE (EN55022 Class A, EN61000-3-2 Class A, EN61000-3-3, EN55024), FCC (Part 15 Subpart B, CISPR 22 Class A), CCC (GB9254, GB 17625.1)
Safety	UL/cUL (UL60950-1, CSA C22.2 No. 60950-1-03), LVD (EN60950-1), CCC (GB4943)
Automatic Reboot Trigger	Built-in WDT (watchdog timer)
Warranty	5 years

Please note that the Hardware Specifications apply to the embedded computer unit itself, but not to accessories. In particular, the wide temperature specification does not apply to accessories such as the power adaptor and cables.

Hardware Block Diagram



2

Hardware Introduction

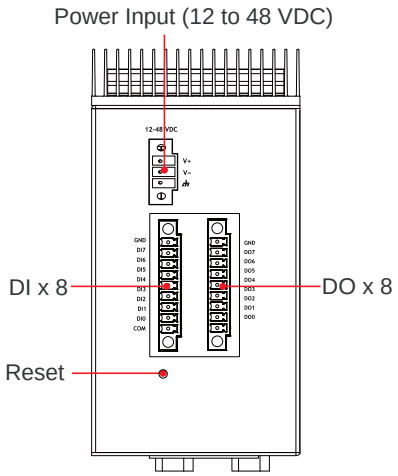
The IA260 embedded computers are compact and rugged, making them suitable for industrial applications. The LED indicators allow users to monitor performance and identify trouble spots quickly, and the multiple ports can be used to connect a variety of devices. The IA260 comes with a reliable and stable hardware platform that lets you devote the bulk of your time to application development. In this chapter, we provide basic information about the embedded computer's hardware and its various components.

In this chapter, we cover the following topics:

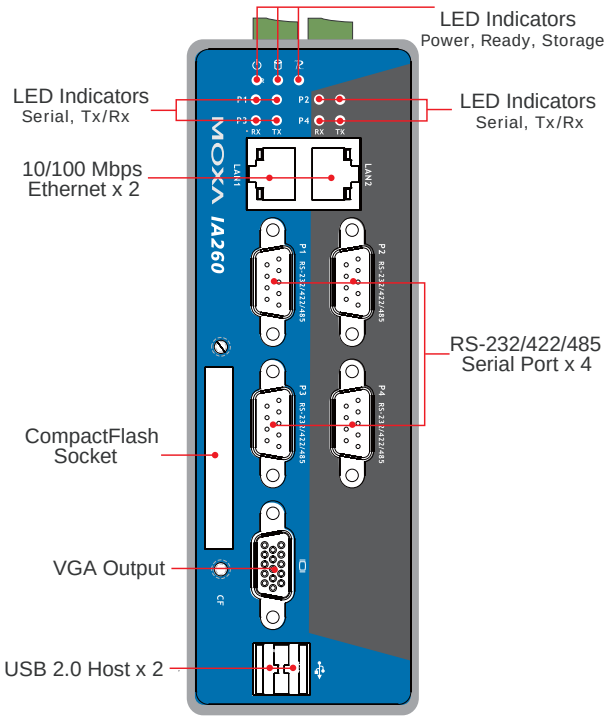
- **Appearance**
- **Dimensions**
- **LED Indicators**
- **Reset Button**
- **Real Time Clock**
- **Placement Options**
  - DIN-Rail Mounting
  - Wall Mounting (optional)

Appearance

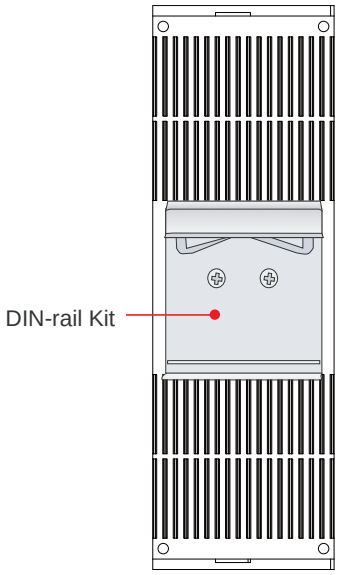
Top View



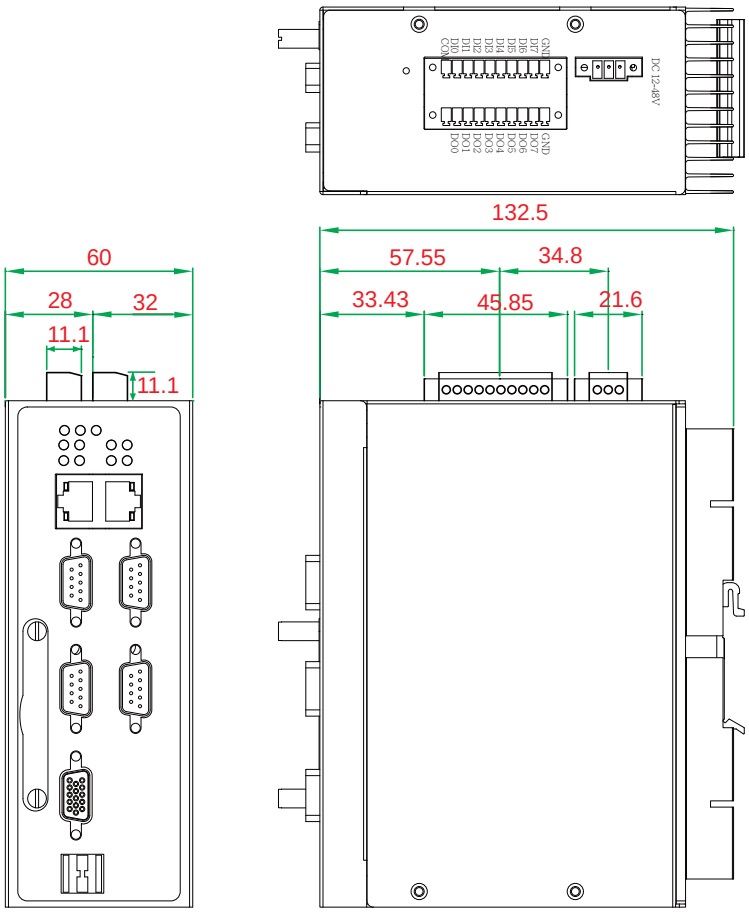
Front View



Rear View



Dimensions



LED Indicators

The IA260 has 15 LED indicators on the front panel. Refer to the following table for information about each LED.

LED Name	Color	Meaning
Power	Green	Power is ON.
	Off	No power is being received, or power error exists.
Ready	Green	OS is ready and functioning normally (after booting up).
	Off	OS is not ready.
Storage	Green	Data is being written to or read from the storage unit.
	Off	Storage unit is idle.
LAN1, LAN2	Orange	10 Mbps Ethernet connection
	Green	100 Mbps Ethernet connection
P1-P4 (TX)	Green	Serial port is transmitting TX data to the serial device.
	Off	Serial port is not transmitting TX data to the serial device.
P1-P4 (RX)	Orange	Serial port is receiving RX data from the serial device.
	Off	Serial port is not receiving RX data from the serial device.

Reset Button

The IA260 has a reset button located on the top panel. The reset button can be used to do a simple **Reset**, which is equivalent to turning the power off and then back on again, or **Reset to default**, which returns the IA260 to its factory default parameter configuration.

Reset Function

Pressing the **Reset Button** then releasing it in less than one second initiates a hardware reboot. The button plays the same role as a desktop PC's reset button.

In normal use, you should NOT use the **Reset** Button. You should only use this function if the software is not working properly. To reset an embedded system, always use the operating system's software reboot command to protect the integrity of data being transmitted or processed.

Reset to Default

Press and hold the **Reset Button** continuously for at least 5 seconds to load the **factory default configuration**. After the factory default configuration has been loaded, the system will reboot automatically. The **Ready** LED will blink on and off for the first 5 seconds, and then maintain a steady glow once the system has rebooted.

We recommend that you only use this function if the software is not working properly and you want to load factory default settings. The **Reset to Default** functionality is not designed to hard reboot the IA260.

ATTENTION

Reset to Default preserves user's data

The **Reset to Default** function will NOT format the user directory and erase the user's data. Using the Reset to default function will only load the configuration file. The rest of the user's data stored in the Flash ROM will remain intact.

Real Time Clock

The IA260's real time clock is powered by a lithium battery. We strongly recommend that you do not replace the lithium battery without help from a qualified Moxa support engineer. If you need to change the battery, contact the Moxa RMA service team.

WARNING

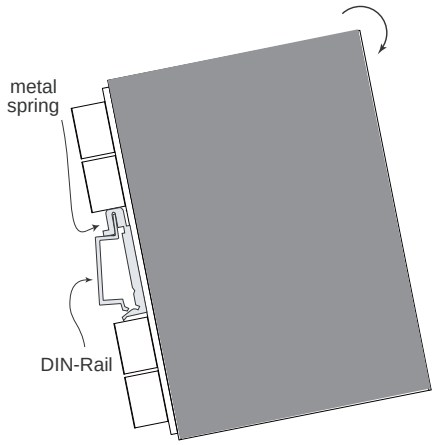
There is a risk of explosion if the battery is replaced by an incorrect type.

Placement Options

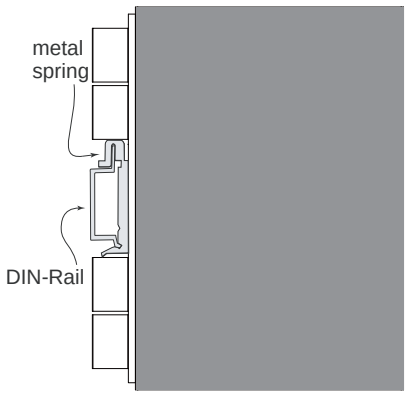
DIN-Rail Mounting

The aluminum DIN-Rail attachment plate is already attached to the product's casing. To attach the plate to IA260, make sure that the stiff metal spring is facing the top of the IA260, as shown in the following figures.

STEP1: Insert the top of the DIN-Rail into the slot just below the stiff metal spring.



STEP2: The DIN-Rail attachment unit will snap into place as shown.

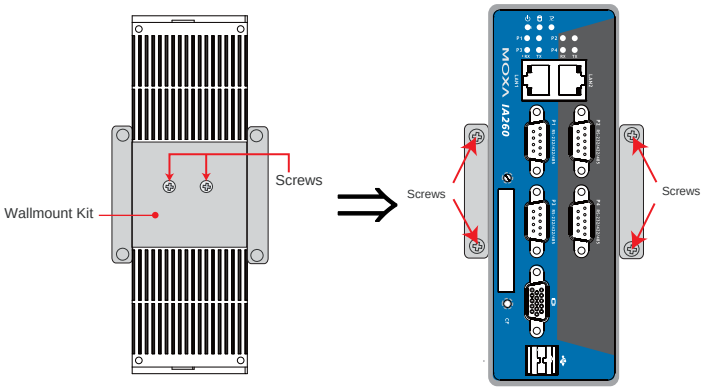


To remove the IA260 from the DIN-Rail, simply reverse Steps 1 and 2.

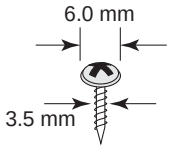
Wall Mounting (optional)

For some applications, you will find it convenient to mount the IA260 on the wall, as depicted in the following illustrations.

STEP 1:
Attach the wallmount kit to the IA260's rear panel with 2 screws.



STEP 2:
Mounting the IA260 on the wall requires 4 screws. Use the switch, with wall mount plates attached, as a guide to mark the correct locations of the 4 screws. The heads of the screws should be less than 6.0 mm in diameter, and the shafts should be less than 3.5 mm in diameter, as shown in the figure at the right.



NOTE Before tightening the screws into the wall, make sure the screw head and shank size are suitable by inserting the screw into one of the keyhole-shaped apertures of the Wall Mounting Plates.

3

Hardware Connection Description

This section describes how to connect the IA260 to a network and various devices for first time testing purposes.

The following topics are covered in this chapter:

- **Wiring Requirements**
  - Connecting the Power
  - Grounding the Unit
- **Connecting to the Console Port**
- **Connecting to a Display**
- **Connecting to a Keyboard and Mouse**
- **Connecting to the Network**
- **Connecting to a Serial Device**
- **Connecting to the DI/DO**
  - Digital Input Wiring
  - Digital Output Wiring
- **Insert CompactFlash Card**
- **USB Hosts**

Wiring Requirements

In this section, we describe how to connect various devices to the embedded computer. You should heed the following common safety precautions before proceeding with the installation of any electronic device:

- Use separate paths to route wiring for power and devices. If power wiring and device wiring paths must cross, make sure the wires are perpendicular at the intersection point.

  NOTE: Do not run signal or communication wiring and power wiring in the same wire conduit. To avoid interference, wires with different signal characteristics should be routed separately.

- You can use the type of signal transmitted through a wire to determine which wires should be kept separate. The rule of thumb is that wiring that shares similar electrical characteristics can be bundled together.
- Keep input wiring and output wiring separate.
- When necessary, it is strongly advised that you label wiring to all devices in the system.

ATTENTION

Safety First!

Be sure to disconnect the power cord before doing installations and/or wiring.

Electrical Current Caution!

Calculate the maximum possible current in each power wire and common wire. Observe all electrical codes dictating the maximum current allowable for each wire size.

If the current goes above the maximum ratings, the wiring could overheat, causing serious damage to your equipment.

Temperature Caution!

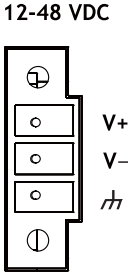
Be careful when handling the unit. When the unit is plugged in, the internal components generate heat, and consequently the outer casing may feel hot to the touch.

Connecting the Power

The IA260 has a 3-pin terminal block for a 12 to 48 VDC power input.

The following figures show how the power input interface connects to external power sources. If the power is properly supplied, the Power LED will light up. The Ready LED will glow a solid green color when the operating system is ready (it may take 30 to 60 seconds for the operating system to boot up).

Terminal Block



ATTENTION

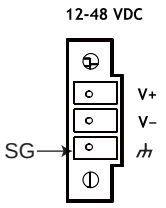
The power for this product is intended to be supplied by a Listed Power Supply Unit that is rated to deliver 12 to 48 VDC at a minimum of 1200 mA for 12 VDC, and 260 mA for 48 VDC.

Grounding the Unit

Grounding and wire routing helps limit the effects of noise due to electromagnetic interference (EMI). Run the ground connection from the ground screw to the grounding surface prior to connecting devices.

ATTENTION

This product is intended to be mounted to a well-grounded mounting surface, such as a metal panel.



SG: The *Shielded Ground* (sometimes called *Protected Ground*) contact is the bottom contact of the 3-pin power terminal block connector when viewed from the angle shown here. Connect the SG wire to an appropriate grounded metal surface.

ATTENTION

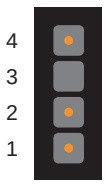
A shielded-type power core is required in order to meet FCC emission limits and also to prevent interference to nearby radio and television reception. It is essential that only the supplied power cord be used.

You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

Connecting to the Console Port

The IA260's console port is a 4-pin pin-header RS-232 port. It is designed for serial console terminals, which are useful for identifying the boot up message, or for debugging when the system cannot boot up.

Serial Console Port & Pinouts

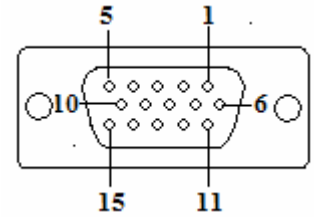


Pin	Signal
1	TxD
2	RxD
3	NC
4	GND

Serial Console Cable

Connecting to a Display

The IA260 comes with a D-Sub 15-pin female connector to connect a VGA CRT monitor. To ensure that the monitor image remains clear, be sure to tighten the monitor cable after connecting it to the V481. The pin assignments of the VGA connector are shown below.

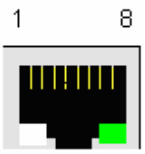
DB15 Female Connector	Pin No.	Signal Definition
	1	Red
	2	Green
	3	Blue
	4	---
	5	GND
	6	GND
	7	GND
	8	GND
	9	---
	10	GND
	11	---
	12	---
	13	H-Sync
	14	V-Sync
	15	---

Connecting to a Keyboard and Mouse

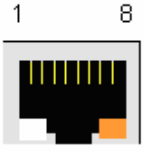
Use the 2 USB hosts located on the front side of unit to connect a keyboard and mouse to the IA260.

Connecting to the Network

Connect one end of the Ethernet cable to one of the IA260's 10/100M Ethernet ports (8-pin RJ45) and the other end of the cable to the Ethernet network. If the cable is properly connected, the IA260 will indicate a valid connection to the Ethernet in the following ways:



The LED indicator in the lower right corner glows a solid green color when the cable is properly connected to a 100 Mbps Ethernet network. The LED will flash on and off when Ethernet packets are being transmitted or received.



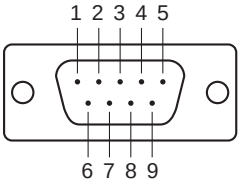
The LED indicator in the lower left corner glows a solid orange color when the cable is properly connected to a 10 Mbps Ethernet network. The LED will flash on and off when Ethernet packets are being transmitted or received.

Pin	Signal
1	ETx+
2	ETx-
3	ERx+
4	---
5	---
6	ERx-
7	---
8	---

Connecting to a Serial Device

Use properly wired serial cables to connect the IA260 to serial devices. The serial ports of the IA260 use male DB9 connectors. The ports can be configured by software for RS-232, RS-422, or 2-wire RS-485. The precise pin assignments are shown in the following table:

Male DB9 Port



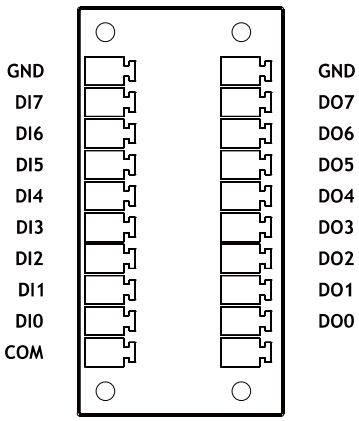
RS-232/422/485 Pinouts

Pin	RS-232	RS-422	RS-485 (4-wire)	RS-485 (2-wire)
1	DCD	TxDA(-)	TxDA(-)	---
2	RxD	TxDB(+)	TxDB(+)	---
3	TxD	RxDB(+)	RxDB(+)	DataB(+)
4	DTR	RxDA(-)	RxDA(-)	DataA(-)
5	GND	GND	GND	GND
6	DSR	---	---	---
7	RTS	---	---	---
8	CTS	---	---	---

Connecting to the DI/DO

The IA260 has an 8-ch digital input and 8-ch digital output. The digital input channels and digital output channels are located on the top side of the unit in a terminal block. The pinouts for the I/O are shown in the figure.

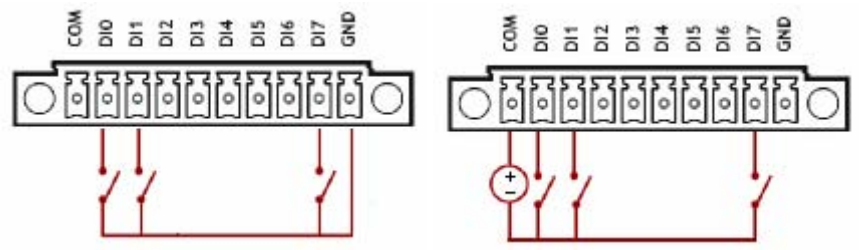
Digital Input and Output Channel (10-pin Terminal Block)



Additional wiring instructions are given below.

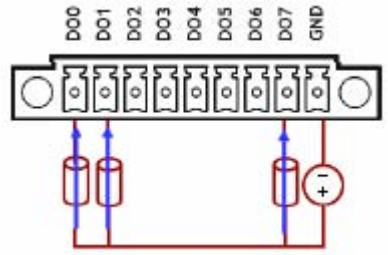
Digital Input Wiring

Dry Contact **Wet Contact**



Note: If you are using wet contacts, you must connect "COM" to power.

Digital Output Wiring



Insert CompactFlash Card

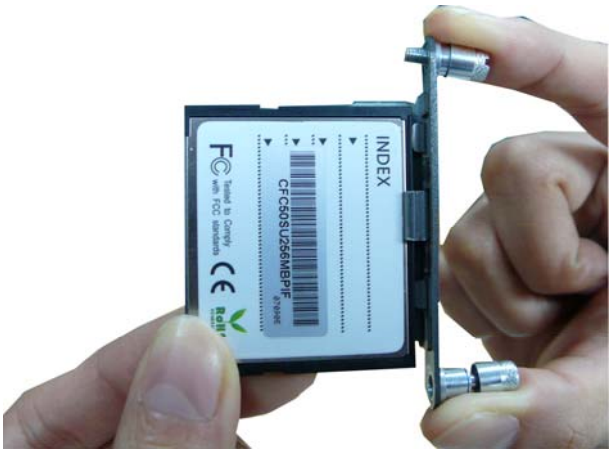
The IA260 has a built-in CompactFlash socket that allows users to add additional memory by inserting a CompactFlash memory card, without any risk to the computer.

Follow the instructions below to insert a CompactFlash card:

1. Remove the power source.
2. Unscrew the CompactFlash socket protection cover which is located on the front of the unit.

3. Be sure to insert the CompactFlash card correctly into the protective cover, as shown in the figure below.

4. Insert the CompactFlash protective cover with the CompactFlash card into the socket, as shown in the figure. Be sure to keep the angle vertical relative to the front panel.



5. Screw the protective cover to the font panel.

ATTENTION

The IA260 does not support CompactFlash hot swap and PnP (Plug and Play) function. It is necessary to remove power source first before inserting or removing the CompactFlash card.

USB Hosts

The IA260 provides 2 USB 2.0 full speed hosts (OHCI), type A connectors, which support a keyboard or mouse, as well as an external flash disk for storing large amounts of data.

A

Regulatory Approval Statements

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Class A: FCC Warning! This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

European Community

Warning:

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.